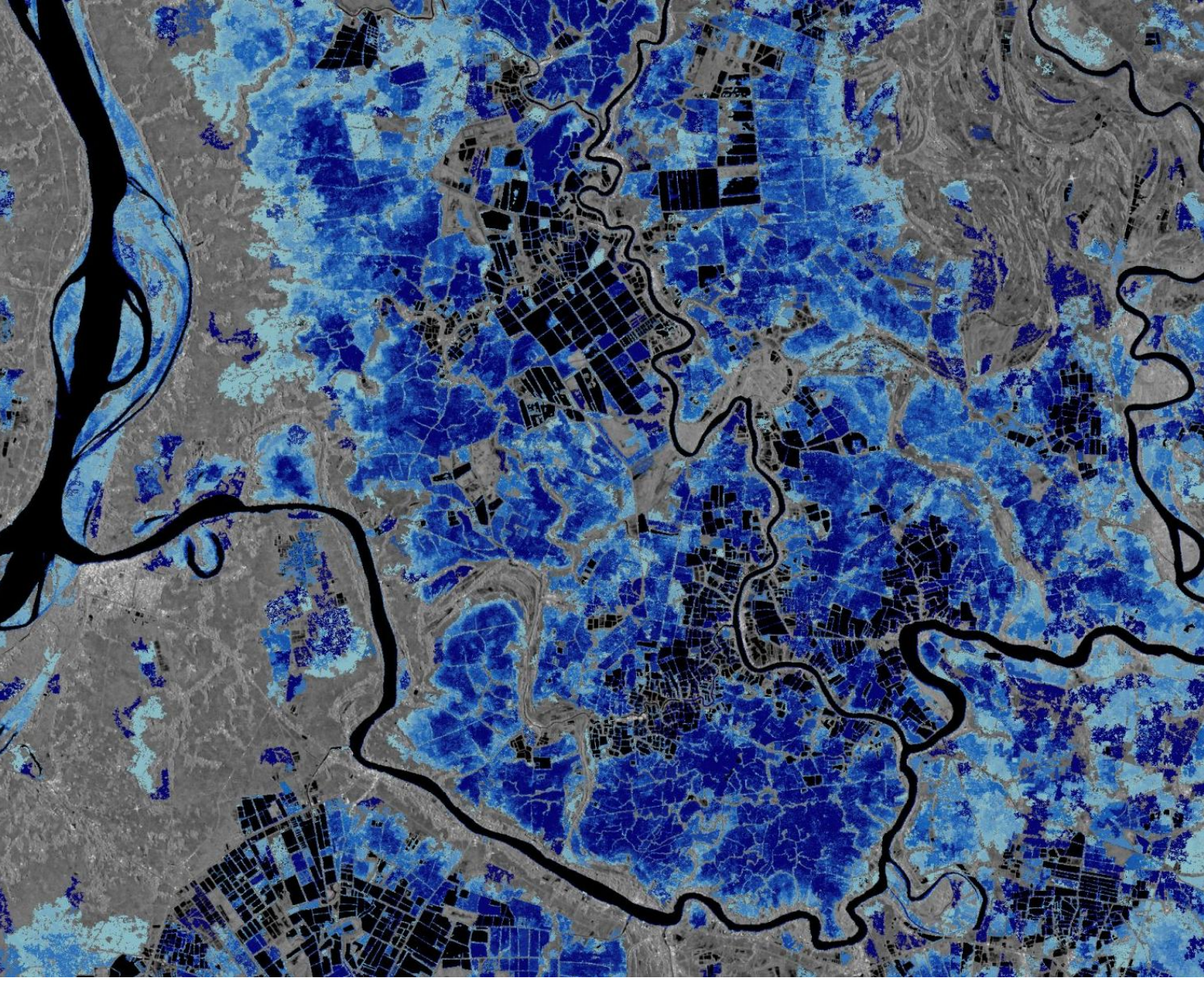


Modified Copernicus Sentinel data (2021), processed by the Luxembourg Institute of Science and Technology (LIST)

SPACE DATA FOR NATIONAL RESILIENCE

A Space4Climate Workshop

Held: September 30, 2026

Matching proven space solutions to urgent resilience and security challenges.

How can the UK harness its world-class space and Earth Observation (EO) capabilities to strengthen national resilience in an increasingly volatile world?

Workshop Report final version dated 03.11.2026

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Space4Climate

Who is this Report for?

This is a summary record and report of the event for the attendees.

This report will be used as a baseline to help inform Space4Climate and members on how the EO community can address barriers and meet opportunities.

Introduction

This report is framed around a simple but urgent challenge: how can the UK harness its world-class space and Earth Observation (EO) capabilities to strengthen national resilience in an increasingly volatile world?

It is based on specific challenges in improving national resilience in the UK, shared through problem-holders at the Space Data For National Resilience Workshop, the knowledge exchanged and potential next steps identified.

In producing this report, the aim is to:

- Capture problem statements from users' perspectives.
- Identify and develop satellite data-driven solutions with problem-holders.
- Test and strengthen these solutions through wider input from users and EO experts.
- Set out clear routes to action that maximise current UK satellite data capabilities to improve national resilience.
- Turn insight into investment opportunities, helping policymakers and funders align UK EO expertise with national resilience needs and to drive growth.

Satellites already underpin an estimated 18% of UK [1]GDP, reflecting the critical role that space-based infrastructure, data and services play across the economy. Yet the drivers shaping our future are changing rapidly. Geopolitical uncertainty, accelerating technological innovation, climate change and emerging commercial opportunities are creating a compelling case for a more coordinated national approach to space, data and resilience. At the same time, the indicators of climate risk are becoming ever more visible, with extreme weather events increasing in frequency, severity and impact. The UK Space strategy published in September 2026 clearly articulates the role of EO for resilience and growth[1].

About Space4Climate

Space4Climate is a neutral convening body supported by academia, government and industry. Our mission is to accelerate the adoption of trusted satellite Earth Observation technologies and data-driven services that support commercial growth, strengthen national climate resilience, and deliver environmental and societal benefits. We do this by bringing together the UK's Earth Observation industry, research community and policy stakeholders to address shared challenges and opportunities.

About the workshop organising team

The workshop was organised by Space4Climate, the UK Space Agency, National Centre for Earth Observation (NCEO) and Space South Central Regional Space Cluster,

[1] UK Space Strategy - GOV.UK

representing the UK's diverse and thriving expertise in using satellite data to address the urgent climate resilience challenges we face today, as well as in the near future.

Background to the event

The problem statements that framed the workshop are based on genuine enquiries brought to the joint UK Space Agency, Space4Climate, National Centre for Earth Observation stand at the Civil Service Climate & Environment Network Conference in March 2026.

Originally scheduled for June 2026, the workshop that informed this report was forced to be postponed, ironically, because of unprecedented heatwave conditions across the UK. It forced the closure of schools and our conference venue, requiring the event to be postponed until September. This experience served as a powerful reminder of the realities that climate change presents and reinforced the importance of the discussions that followed.

Thus, it was on September 30th that more than 70 participants from across government, industry, academia and the wider resilience community came together to examine the challenges facing the UK and the role that space-enabled data, intelligence and services can play in addressing them. This report captures the insights, priorities and next steps that emerged from those discussions.

The UK possesses one of the most innovative and dynamic space sectors in the world; at its heart, this report is about more closely aligning that capability with the practical and systems needs of those making critical and everyday decisions in the face of resilience challenges.

The task now is to create stronger connections between space capabilities and national resilience outcomes. We must demonstrate how Earth Observation research, satellite data and insight services can help decision-makers anticipate risks, respond more effectively to crises and build long-term resilience.

By matching the strengths of the UK space sector with the pressing challenges facing the nation, we can unlock new economic opportunities while delivering tangible benefits for society, the environment and future generations.

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Executive Summary

The UK faces an increasingly complex risk landscape driven by climate change, geopolitical uncertainty, pressure on critical infrastructure, environmental degradation and growing societal expectations for resilient public services. At the same time, the UK possesses world-leading capabilities in satellite technology, Earth Observation (EO), geospatial analytics and environmental science. The challenge is not a lack of capability, but how to align existing space-enabled assets with national resilience priorities.

The Space for National Resilience workshop brought together more than 70 representatives from government, industry, academia and the resilience community to explore how satellite-derived data and services can support decision-making across infrastructure, forestry, nature recovery, soil health and climate risk management.

The detailed problem statements discussed are shared in the Appendix.

Despite spanning diverse sectors, five common themes emerged.

1. Earth Observation is an essential capability

EO is seen by the community as essential data and intelligence that underpins many other services, decisions, and capabilities. That it is not necessarily an end product itself, but a core enabling capability on which other activities depend.

Participants consistently highlighted that EO should not be viewed as a standalone technology solution. The greatest value comes when satellite observations are integrated with ground-based monitoring, operational data, modelling, artificial intelligence and domain expertise.

Decision-makers require trusted intelligence products that answer operational questions, rather than simply increasing the volume of available data. Whether monitoring forest health, assessing habitat condition, managing flood risk or supporting insurance products, EO works best as part of a wider data ecosystem.

2. Data integration and standards remain the largest barrier

Across every workshop session, participants identified fragmented data systems, inconsistent standards and poor interoperability as significant barriers to adoption.

Environmental, infrastructure and risk-management datasets are often held by different organisations, collected using different methods and governed by different standards. This limits the ability to combine datasets, scale solutions and establish confidence in outputs.

Common data frameworks, standards and governance arrangements will be essential if EO is to move from innovation projects into operational decision-making.

3. National baseline datasets are a strategic priority

A recurring requirement across forestry, nature recovery, soil health and climate resilience was the need for trusted baseline datasets.

Participants highlighted the value of foundational national data assets combining Earth Observation, LiDAR, environmental sensors and ground-truth observations. These datasets would enable long-term monitoring, policy evaluation, risk assessment and AI model development while reducing duplication of effort across organisations.

4. The greatest value lies in projecting and predicting future scenarios.

There was broad agreement that the future opportunity for EO lies in moving beyond observation towards future scenarios and prediction.

Participants identified significant demand for systems capable of forecasting climate impacts, identifying emerging risks, detecting ecosystem tipping points, prioritising interventions and supporting proactive rather than reactive decision-making.

Applications discussed included wildfire monitoring, flood risk assessment, habitat vulnerability mapping, forest resilience, soil health monitoring and climate risk modelling for financial services.

5. Shared public services deliver the strongest business case

Many resilience challenges cut across organisational and departmental boundaries. As a result, the strongest value proposition comes from developing shared capabilities and services that serve multiple users simultaneously.

This finding aligns closely with the conclusions of the Northern Ireland Space Enabled Region Pathfinder[2], which identified satellite-derived data as a shared public sector capability and procurement of services supporting environmental management, infrastructure resilience, agriculture, planning and public administration through common data services.

Strategic opportunities

The workshop identified five strategic opportunities for the UK:

- Establish a National Earth Observation Data Framework to enable interoperability across different capabilities to enable uptake by the real world. e.g. what standards are required, meta data and access.
- Invest in environmental and resilience datasets.
- Create resilience-focused sandboxes, demonstrators and testbeds.
- Develop trusted frameworks for integrating EO, AI and operational decision-making.

[2] https://matrixni.org/documents/space-enabled-region-pathfinder/

- Strengthen pathways between EO innovators and public sector users to enable the uptake of EO derived services.

Overall conclusion

The strongest message from the workshop was that national resilience requires a systems approach.

> *Success will depend less on individual satellite missions or isolated applications, and more on creating an integrated resilience intelligence capability that combines satellite data, terrestrial monitoring, modelling, AI and expert knowledge.*

By treating EO as part of our national data infrastructure, the UK has an opportunity to improve resilience outcomes, strengthen public services, accelerate environmental recovery and support economic growth while maximising the value of investment in the domestic space sector.



Figure 1 Prof John Remedios, Executor Director of NCEO and Space4Climate Board member

1. Cross-Cutting Findings

Common challenges

Across all workshop themes, several recurring challenges emerged:

Fragmented data ecosystems

Data required to support resilience outcomes is often distributed across multiple organisations and sectors. Environmental observations, geospatial information,

operational datasets and field measurements frequently exist in isolation, making them difficult to access, combine and operationalise.

Lack of common standards

Participants across all sectors repeatedly identified inconsistent methodologies, formats and measurement approaches as barriers to scaling EO-enabled services. Without common standards, outputs remain difficult to compare, validate and trust.

Limited access to location and boundary data

Location intelligence underpins many resilience use cases, yet access to consistent geographic boundary information remains challenging. This affects environmental monitoring, climate-risk assessment, insurance modelling and land-management applications.

Gap between EO capability and user needs

Many organisations remain unclear about what EO can realistically deliver and how it should be integrated into existing workflows. Bridging this gap requires stronger collaboration between EO providers, policymakers and end users.

To create useful solutions, the EO community needs to understand not only the problem statement but also the policy and operational mechanisms through which organisations can actually implement change.

Dependence on ground truth data

EO cannot operate in isolation. Across all sectors, participants emphasised the importance of integrating satellite observations with field measurements and operational datasets to improve confidence, calibration and decision-making.

Who pays?

This was seen as a common adoption barrier. Proof of concepts tend to be created in silos with limited pathways to acquisition or adoption. Tight margins were quoted as reducing opportunities to create fully operational systems, yet reliable and affordable solutions for the customer were needed. The tendency to take an external pilot and convert it to an internal department capability was also seen as a barrier to the creation of operational services that can be scaled

Adoption issues were also discussed on who funds data acquisition, who maintains datasets, and what form data should be delivered in.

Focus on measurable outcomes

Users want measurable outcomes over appropriate timescales. There is an acute need for operational-led rather than technology-led solutions.

A recurring theme from the Nature discussion group was the need to move beyond monitoring and towards supporting decisions and prioritisation. There is a need for data to be converted into actionable decisions and investment prioritisation.

Systems approach beyond Earth Observation

Climate resilience is not a problem for EO to solve alone and requires collaboration between academia, communities, landowners, legal professionals and policymakers.

2. Common Opportunities

National datasets

Investment in national baseline datasets emerged as one of the highest-value opportunities. Shared datasets would support multiple policy objectives while reducing duplication and improving consistency.

Predictive risk intelligence

Transitioning from retrospective monitoring to predictive intelligence could transform resilience planning across infrastructure, forestry, nature recovery and climate adaptation.

Shared Public-Sector data services

Participants consistently advocated for shared infrastructure and data services that support multiple departments and organisations. This approach improves efficiency and creates stronger business cases for investment.

AI-enabled monitoring

Artificial intelligence offers significant potential to automate environmental monitoring, change detection and risk forecasting, provided sufficient trusted training data exists.

Demonstrators and testbeds

Test environments were viewed as critical mechanisms for validating approaches, building confidence and accelerating operational adoption. However, it was also commented that we need to be able to move beyond the test environment to create operational services that are affordable for end customers.

Attendees felt that Earth Observation should be treated as a shared national resilience capability built upon common data foundations, standards and collaborative delivery models.

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3. Discussion Group Summaries

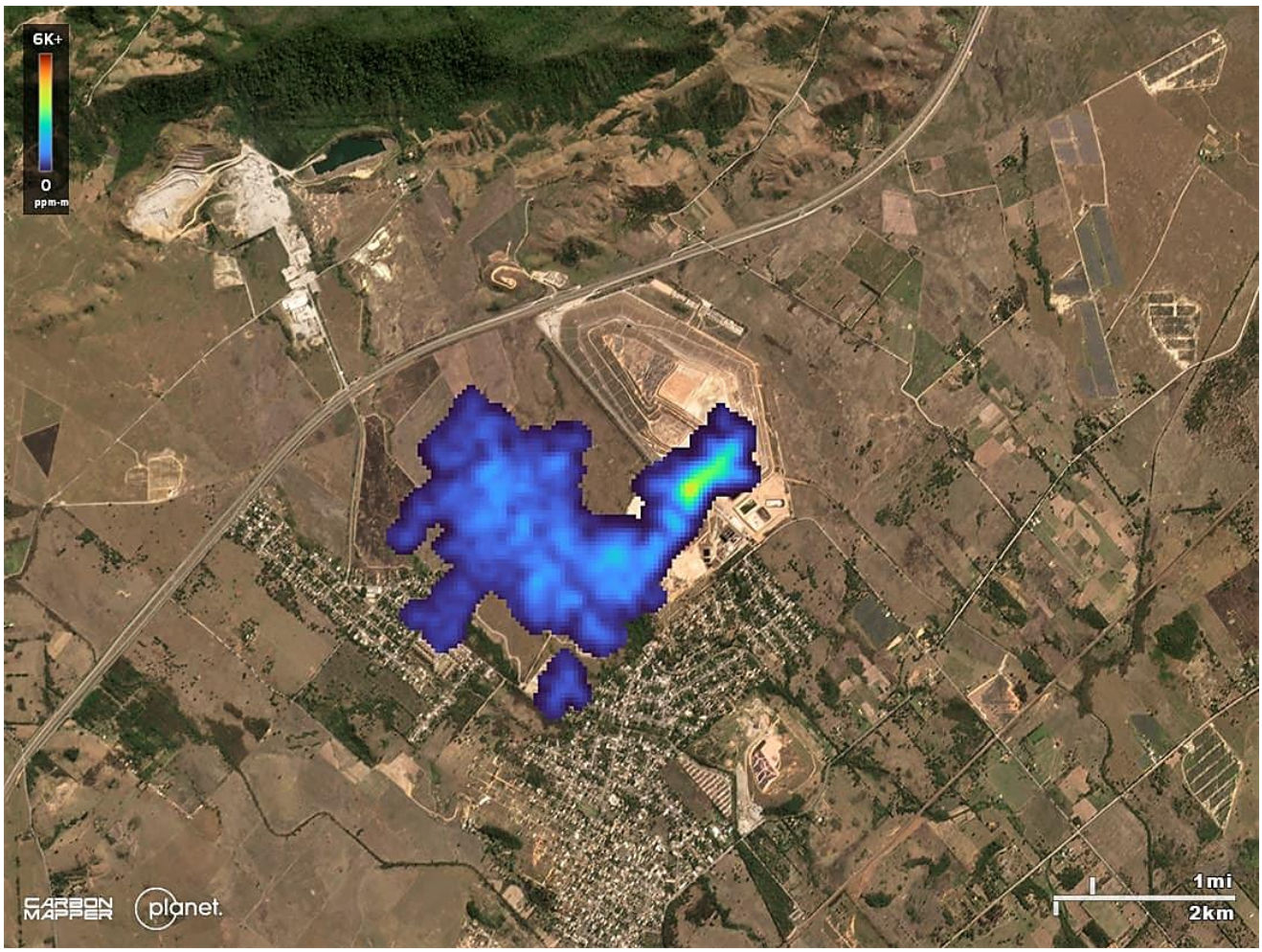


Figure 2 Carbonmapper methane detection image, source (Methane, CO2 Detection Satellite | Greenhouse Gas | Carbon Mapper:) : Additional information : Mitigating Climate Change Through Carbon Monitoring Globally | Planet

3.1 Space Data for Critical Infrastructure

Challenge

Critical infrastructure operators face increasing risks from climate change, ageing assets, emissions reduction requirements and growing interdependencies across infrastructure systems. Decision-makers require reliable intelligence to monitor assets, manage risks and support long-term resilience planning.

Key findings

- EO can provide scalable monitoring of infrastructure assets and surrounding environmental conditions.

- Satellite data has the potential to support methane leak detection across gas networks, particularly in remote or difficult-to-access locations, although in the UK this could be also achieved alongside ground sensors.
- Public sector estates could benefit from EO-enabled monitoring of emissions, flood risk and heat stress.
- Planning and resilience decisions require integrated environmental, operational and geospatial datasets.
- Data sharing, governance and user awareness remain significant barriers to adoption.
- Those advising Ministers should be able to understand and articulate the key messages from EO datasets and services, enabling them to provide clear, accurate and relevant reporting up the line.

Infrastructure is not one challenge, but multiple distinct challenge areas

The discussion highlighted that participants saw the energy and infrastructure sector as spanning multiple problem spaces, including:

- Infrastructure installation and construction monitoring.
- Asset stability and ground movement monitoring.
- Operational asset management.
- Methane and emissions monitoring.
- Critical infrastructure resilience.

Government representatives highlighted the need for:

- Transparent confidence metrics.
- Clear communication of uncertainty.
- Frameworks for comparing alternative solutions.
- Evidence products that can be confidently translated into policy decisions.

Cost and commercial constraints

The workshop raised questions around:

- Clarity on funding envelope for services, which will be purchased for the sector?
- What level of service can users afford?
- Public sector use cases may not justify commercial imagery costs, however can centralised procurement options change this?

A major discussion theme was not simply integrating datasets but integrating EO into operational systems and workflows; e.g.

- Existing infrastructure management models often do not accommodate EO.
- EO is most valuable when integrated within existing user systems.

- Users already possess operational and utility datasets that should be leveraged.
- Satellite data should not be treated as a standalone feed.

Opportunities

- Methane monitoring and gas network leak detection.
- Long-term monitoring of strategic infrastructure, including nuclear facilities.
- Public estate emissions monitoring and climate-risk assessment.
- Flood and heat early-warning services.
- Infrastructure vulnerability mapping and investment prioritisation.
- Data-driven planning for resilient communities and sustainable growth.
- Stronger relationships between policy, infrastructure operators and the EO community

Next steps

- Develop pilot programmes to assess the operational use of EO for methane monitoring and infrastructure resilience.
- Integrate EO with operational, engineering and asset-management datasets.
- Establish shared infrastructure intelligence services and common data frameworks.
- Improve access to trusted geospatial and climate-risk information for planners and infrastructure operators.
- Strengthen engagement between end users and the EO community to ensure solutions are driven by clearly defined operational needs. Participants highlighted a disconnect between EO providers and potential users. Greater collaboration is needed to define challenges more clearly, improve communication of EO capabilities and ensure that solutions are developed around operational requirements rather than technology-led opportunities. Engage infrastructure owners to refine priority operational use cases.
- Engage policymakers on a framework to support the question around transparency, comparability and interoperability of different data and systems.
- Develop demonstrations focused on methane monitoring, climate-risk intelligence and infrastructure resilience.
- Improve how EO-derived insights are communicated to non-specialist decision-makers. Participants highlighted that infrastructure challenge statements are often insufficiently defined. Greater clarity is needed on operational needs, decision-making processes, required outputs and budget constraints before EO solutions can be effectively matched to user requirements. However, it was also noted that information must also be made available by the solution providers in a way that policymakers and operators can understand. In particular, EO providers should try to

understand how policy departments and infrastructure operators make decisions and implement change, ensuring solutions align with operational and regulatory processes.

Those in advisory or decision-making roles, need to be able to understand and articulate the key messages from EO datasets, translating technical outputs into clear, relevant and decision-ready information for senior leaders

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- Build relationships with an Ofgem-licensed electricity or gas distribution network, transmission operator, or National Energy System Operator (NESO) to develop concepts for calls (e.g. the Ofgem Strategic Innovation Fund Discovery[3])
- The Unlocking Space for Government Programme was identified as a suitable programme to translate end user need in government departments into clear challenge statements with associated funding for industry to respond to.
- The Government Digital Service (GDS) intended public sector purchase of EO data is expected to open up use cases which were previously not accessible due to procurement restrictions or cost barriers.

S4C Members present at the discussion with relevant services	*Example*
Airbus Pioneering sustainable aerospace | Airbus	Provides high-resolution satellite imagery, radar data and geospatial analytics for monitoring critical infrastructure, construction activity, ground movement and asset condition.
Telespazio	Delivers Earth Observation and geoinformation services for monitoring transport networks, utilities, pipelines, dams and other critical infrastructure assets
NV5 NV5 - Technical Engineering & Consulting Solutions	Provides geospatial intelligence, remote sensing, LiDAR, digital twins and asset analytics to support infrastructure inspection, utility management and resilience planning
Esri GIS Software, Spatial Analytics & Location Intelligence | Esri UK	Delivers GIS platforms and spatial analytics that enable organisations to map, monitor and manage infrastructure assets, networks and operational risk
Catalyst CATALYST Earth - CATALYST	Provides satellite-based risk monitoring and ground displacement analytics to identify infrastructure hazards, asset deterioration and climate-related risks

[3] Ofgem Strategic Innovation Fund Discovery C7 – UKRI

Case Study: CATALYST- Rail resilience through EO and predictive weather risk intelligence

Customer: Network Rail

CATALYST is the Earth Observation brand of PCI Geomatics, a Canadian company with more than 45 years in satellite image processing with a UK office in Harwell. We work with space agencies, imagery providers and infrastructure owners worldwide.

The problem: weather-driven disruption is rising on Britain's railway. Climate variability, ageing earthworks and dense vegetation are driving up the cost of disruption. On the Wessex Route, south-west London's busy commuter network, vegetation is surveyed only every three years. Network Rail asked: could satellite data show where risk is building *before* an event?

The solution delivered was a daily risk forecast for every stretch of track.

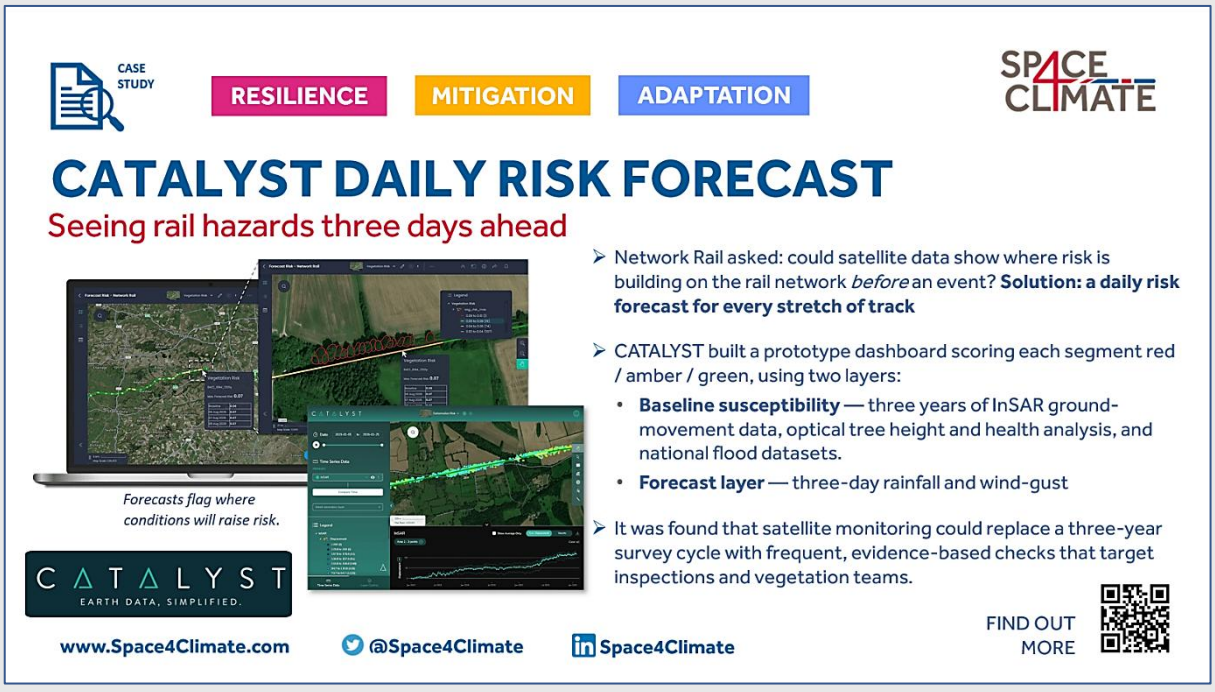
CATALYST built a prototype dashboard scoring each segment red / amber / green, using two layers:

- Baseline susceptibility — three years of InSAR ground movement data, optical tree height and health analysis, and national flood datasets.
- Forecast layer — three-day rainfall and wind-gust.

The outcome: Wessex operational users found the outputs broadly consistent with known risk areas, and flagged tree-fall risk as a potentially valuable insight. Satellite monitoring could replace a three-year survey cycle with frequent, evidence-based checks that target inspections and vegetation teams.

"This pilot has explored how satellite-derived datasets and weather information could give operational teams an earlier view of potential vegetation and flooding risks."

- Network Rail



3.2 Space Data for Forestry

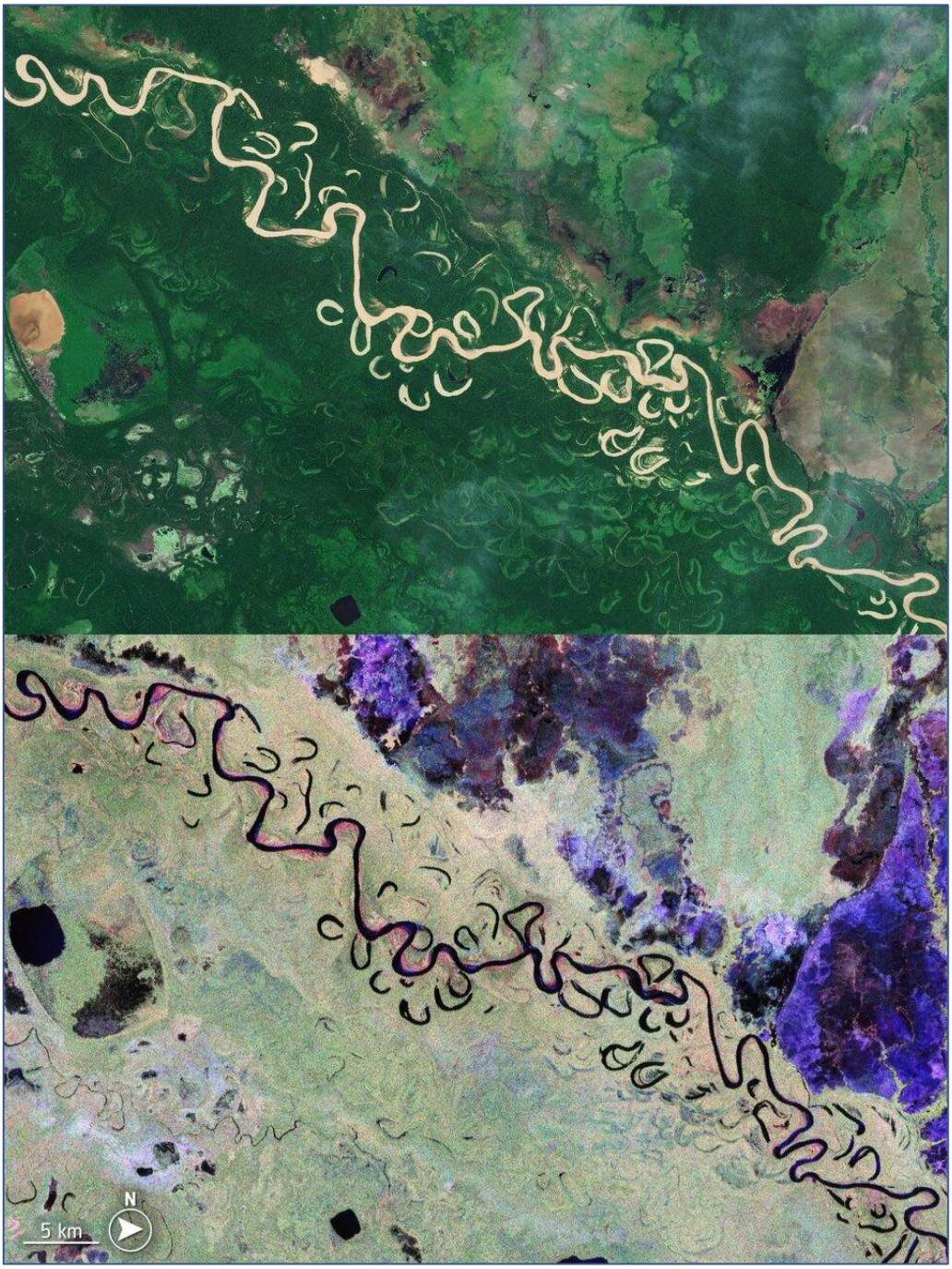


Figure 3 BIOMASS satellite data image - designed to measure global forest biomass.to understand carbon storage https://www.esa.int/Applications/Observing_the_Earth/FutureEO/Biomass/Biomass_satellite_returns_striking_first_images_of_forests_and_more

Challenge

Forestry organisations require robust, cost-effective methods for monitoring woodland health, carbon sequestration, replanting programmes and climate-related risks such as

wildfire and storm damage. Existing monitoring approaches lack consistency and are difficult to scale nationally.

Key findings

- Ground-based monitoring is often inconsistent and resource intensive.
- Carbon accounting requires repeatable and trusted measurement approaches.
- EO enables the delineation of ecological and project boundaries using consistent, spatially explicit measurement.
- EO measurements are tied to fixed spatial units, enabling precise repeat measurement through time.
- EO is Cost-effectiveness at scale for monitoring large areas and relatively homogeneous landscapes.
- EO performs well in remote or difficult-to-access areas where field-based data capture is logistically constrained.
- Whilst EO offers significant benefits for large-scale monitoring, it is always indirect, so it must be underpinned by ground-based calibration and validation measurements.
- Long satellite archives enable retrospective analysis, allowing comparable metrics to be reconstructed for earlier time periods.
- AI-enabled monitoring depends on the availability of high-quality training data.
- A lack of common standards limits interoperability across organisations and programmes.
- Users require measurable outcomes rather than data products.
- Ground-truth data quality varies significantly.
- EO can provide consistency across geographical and temporal scales if its limitations are understood.
- Better calibration and validation datasets are needed, particularly to support emerging AI applications. These data are a key investment as they underpin everything else. They should not be considered a 'nice to have'. It was reported that it is much harder to fund these critical datasets than hardware.

Opportunities

- National forest health monitoring including urban green infrastructure.
- Independent verification of woodland creation and restoration programmes.

- Carbon credit validation and reporting.
- Wildfire risk assessment and emergency response.
- Development of national training datasets for AI-based monitoring systems.
- There are inherent benefits of EO as a data capture method for projects that require Monitoring, Reporting, and Verification (MRV) and use financial mechanisms (e.g. nature and carbon credits).
- Earth Observation is well suited for designing metrics for nature and carbon codes because it provides consistent spatial coverage, long-term archives, and repeatable processing methodologies that support both baseline risk framing and ongoing MRV. This is suitable to determine the units of accounting, which are critical as they form the legal basis for calculating financial transaction[4].

Next Steps

- Establish a national forestry monitoring framework based on common metrics and standards.
- Create a shared repository of ground-truth data to support model development and validation.
- Invest in foundational datasets, including repeat LiDAR acquisition.
- Adopt a systems approach linking forestry, biodiversity, carbon and resilience objectives.
- Develop operational demonstrations focused on carbon monitoring and woodland resilience.
- Develop user-focused case studies demonstrating measurable outcomes for policymakers and practitioners.

S4C Members present in workshop with relevant services	*Example discussed*
Planet Labs Planet Labs: Satellite Imagery & Earth Data Analytics	Working with Brazil's Federal Police, aiming to tackle illegal deforestation in the Amazon. partnership enabled over 100,000 users across 500 public agencies to monitor around 8.6 million square kilometers of Brazilian territory. Daily satellite imagery was used against illegal logging and mining activities, giving authorities the means to enforce laws and fines more effectively. The same approach can be used in the UK and is currently being tested in Scotland.

[4] https://space4climate.com/mbf_phase2_report_carbonnaturefinance/

Environmental Systems Home - Environment Systems	The Due Negligence report, commissioned by the World Wildlife Fund and prepared by 3Keel and Environment Systems, presents an analysis of the potential consequences of the UK's proposed due diligence obligation. The report features two case studies – soy from Brazil and palm oil from Indonesia. Its overarching finding is that a due diligence law based on whether deforestation is illegal according to producer country laws will not de-link the UK supply chains from deforestation, and it will be difficult for companies to comply with and for the government to enforce it.
GEO (Group on Earth Observations) + UCL	The Bezos Earth Fund and Gordon and Betty Moore Foundation provide $23M to the GEO-TREES consortium led by Smithsonian Institute and including NCEO-UCL (https://www.geo-trees.org/), to provide ground data to underpin satellite estimates of global forest biomass. NCEO-UCL also provides tree canopy estimates using LiDAR for the City of London to help inform their tree management strategy towards net zero.

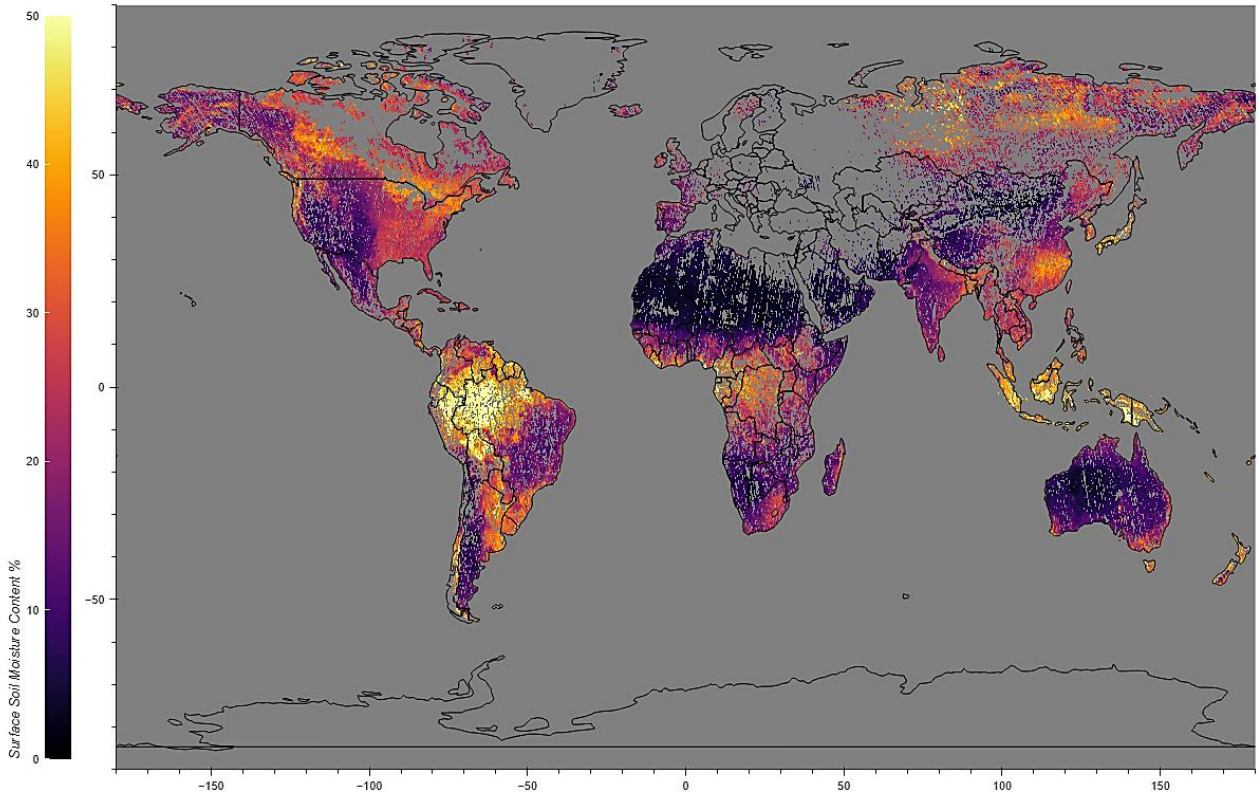


Figure 4 HydroGNSS satellite mission (source: Data Explore) More Information: HydroGNSS Sustainable Climate Variable Sensing from ESA Scout HydroGNSS GNSS Reflectometry Mission

Case Study: Planet Labs - AI-driven analytics for forestry and agriculture

Planet Labs: Satellite Imagery & Earth Data Analytics

Customer: Scotland's Agricultural and Rural Economy Directorate

Space4Climate member Planet Labs deliver their PlanetScope data and advanced analytics to support Scotland's Agricultural and Rural Economy Directorate.

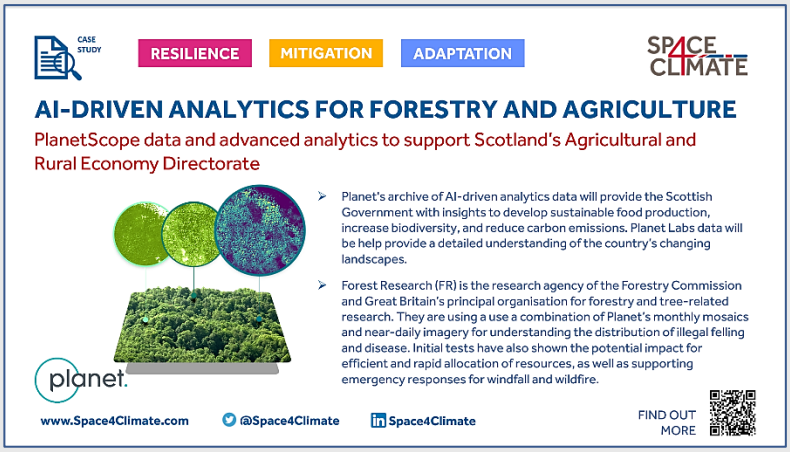
Planet's archive of AI-driven analytics data will provide the Scottish government with insights to develop sustainable food production, increase biodiversity, and reduce carbon emissions. Jo Gray, Director of Scotland's Agricultural Reform Programme, said that the Planet Labs data would be helpful in providing a detailed understanding of the country's changing landscapes.

"We are working with Planet through 2026 to explore how these capabilities may support the Scottish Government in meeting its environmental and climate targets through a more objective and continuous monitoring system," says Gray. "This approach could help track ecological progress, provide valuable evidence to inform decision-making, and support the development of future agricultural reform initiatives."

Forest Research (FR) is the research agency of the Forestry Commission (FC) and Great Britain's principal organisation for forestry and tree-related research. FR is internationally renowned for the provision of science, research, evidence, data and services in support of sustainable forestry. They also use a combination of Planet's monthly mosaics and near-daily satellite images to identify any potential illegal felling activity. In addition, FR has been exploring the use of the data for the early detection of pest and pathogens which affect specific tree species. Initial tests have also shown the potential impact for the efficient and rapid allocation of resources, as well as supporting emergency responses for windfall and wildfire.

Planet already provides similar data and analytics support to other government agencies in the United Kingdom, including the Welsh government, England's Rural Payments Agency and the UK Centre for Ecology and Hydrology.

With over 33 UK team members, Planet Labs opened a UK office this year to meet the ever-increasing demand for their capabilities.



Case Study: Riskaware ground-truth evidence gathering across Wessex

Congregate-Product-Sheet.pdf

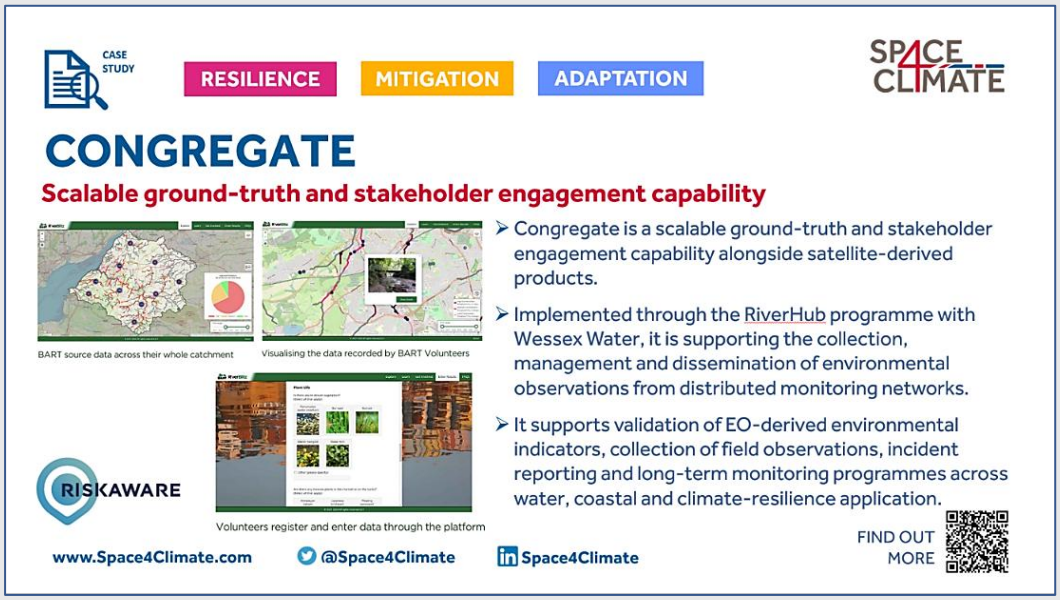
Customer: Wessex Water

For EO companies, one of the key challenges is turning technical capability into an operational, commercially sustainable digital product. Riskaware's focus is on transforming EO-derived data into decision-ready information that helps organisations manage environmental, infrastructure and public safety risks.

Satellite Earth Observation provides powerful insight into environmental conditions, yet many applications still require reliable ground-truth data to validate observations, improve analytics and support operational decision-making. Congregate, Riskaware's configurable environmental monitoring platform, is designed to provide that foundation.

Congregate has been successfully implemented through the RiverHub programme with Wessex Water, supporting the collection, management and dissemination of environmental observations from distributed monitoring networks. Citizen scientists, environmental organisations and programme managers contribute to and help validate data through structured workflows, creating a trusted evidence base for water quality monitoring and intervention planning.

For the EO community, RiverHub demonstrates how Congregate can act as a scalable ground-truth and stakeholder engagement capability alongside satellite-derived products. The same framework can support the validation of EO-derived environmental indicators, collection of field observations, incident reporting and long-term monitoring programmes across water, coastal and climate-resilience applications.



3.3 Space Data for Nature Resilience and Soil Health

Challenge

Nature recovery, climate adaptation and sustainable land management require a better understanding of ecosystem condition, habitat resilience and environmental change. Current monitoring approaches are fragmented, difficult to scale and often lack consistent baseline information.

Detailed problems statements were obtained from Natural England, such as:

- How can they build climate change adaptation thinking into Protected Sites monitoring in the future, such as SSSIs?
- How can they utilise space data to support productivity and wetness Indices?
- What is the potential for informing some elements of condition through the better understanding of indices scale levels and thresholds that could be associated with pass and fail in condition, specific to different habitats or levels of wetness for monitoring, i.e. wetlands, wet or dry grasslands, wet or dry heaths and assessing the impact and frequency of flooding and drought due to climate change over time?

Key findings

- Monitoring climate impacts on habitats, wetlands and protected sites remains a significant challenge.
- EO can support identification of ecosystem tipping points, habitat degradation and restoration opportunities.
- Soil health emerged as a critical underpinning component of wider environmental resilience.
- Effective monitoring requires integration of EO, ground observations, ecological expertise and operational datasets.
- Data availability, standards and location information remain significant barriers.
- Users in the group repeatedly highlighted the need for common indicators and environmental baselines.
- EO can improve nationwide consistency when combined with farmer-supplied ground truth data.
- Data sharing remains a major challenge.
- Existing soil datasets should be leveraged before creating new ones.

- Current approaches often focus on priority habitats and protected areas (e.g. Sites of Special Scientific Interest (SSSIs)), potentially overlooking places where people live and interact with nature.

Data availability and accessibility

- A major challenge is obtaining accurate location data.
    - Organisations may only have postal addresses.
    - Site boundaries, asset locations, and landholding polygons are often unavailable.
- Greater visibility of landholdings would improve monitoring and decision-making.

Opportunities

Climate and nature monitoring

- Climate vulnerability assessments.
- Habitat condition monitoring.
- Wetland and hydrological monitoring.
- Nature recovery and biodiversity indicators.
- Monitoring the effectiveness of nature-based solutions.
- Supply-chain monitoring and due diligence.
- Wildfire management.
- Biodiversity index modelling.
- Identification of habitats at differing levels of risk.
- Develop the concept of a decision funnel' to support prioritisation of actions.
- Establish regulatory sandboxes to test data standards, assurance approaches and EO-derived evidence within different policy and regulatory environments.

Soil Health

- National soil health baseline development.
- Soil moisture and organic matter monitoring.
- Catchment-scale land management.
- Monitoring agricultural impacts including nutrient runoff.
- Water abstraction licensing.

- LEAF [5]and environmental assurance schemes.
- Yield prediction.
- Land-use planning.

Environmental intelligence

- Ecosystem health indicators.
- Natural capital assessment.
- Risk prioritisation and intervention targeting.
- Predictive environmental monitoring, for example using European sites to provide an early warning of risk to UK SSSIs.

Develop a common framework

Create a sandbox environment that allows stakeholders to test and refine approaches using a small number of representative sites covering diverse habitats.

The framework should:

- Accommodate different data contributions from government, industry and landowners.
- Support multiple use cases.
- Be based on agreed standards and interoperability principles.
- Build on historical datasets and established environmental monitoring programmes.
- Enable integration of EO, ground observations and other environmental information.

Next steps

- Set up a working group led by Satellite Applications Catapult to bring together key stakeholders across sectors.
- Establish a national environmental monitoring framework built on common standards and indicators.
- Develop a National Soil Health Database and baseline dataset.
- Create environmental testbeds spanning a range of habitats and landscapes.

[5] Home Page | LEAF (Linking Environment And Farming)

- Improve integration between EO, field observations and existing government datasets.
- Focus investment on predictive monitoring and early-warning capabilities.
- Prioritise monitoring approaches that support both statutory reporting and operational decision making.

S4C Members present at the discussion with relevant services	*Related product or service example*
Map Impact Map Impact – An innovative tech-for-good company	Provides insights on heat, wildfire, drought and Biodiversity Net Gain at a granular level.
Downforce Technologies Downforce Technologies | Digital Soil Data for Resilient Supply Chains	Provides a digital twin for agricultural land, integrating satellite data and ground-based measurements to deliver actionable insights on soil health, water, nutrients and carbon levels
Earth-i Geospatial Analytics & Intelligence | Earth-i	Delivers satellite analytics for environmental monitoring, land management and natural resource assessment.
Catalyst CATALYST Earth - CATALYST	Provides satellite data processing and environmental intelligence solutions for land, biodiversity and infrastructure monitoring.
AAC Clyde Space AAC Clyde Space | Space Data & Satellite Constellation Providers	Supplies Earth Observation data and analytics for agriculture, forestry and environmental monitoring.
Nature Equity Nature Equity | natural capital	Uses AI and satellite data to map habitats, measure natural capital and monitor biodiversity.
OceanMind Home - OceanMind	Uses satellite data and AI to monitor marine ecosystems, emissions and sustainable fisheries.
Planet Labs Planet Labs: Satellite Imagery & Earth Data Analytics	Provides near-daily satellite imagery and analytics for environmental, forestry and land-use monitoring.
Esri UK GIS Software, Spatial Analytics & Location Intelligence | Esri UK	Provides GIS software and spatial analytics, including access to Earth Observation data through their Living Atlas for environmental management, biodiversity and land-use planning

Case Study: Downforce Technologies – Measuring risk across an agricultural loan book

www.downforce.tech

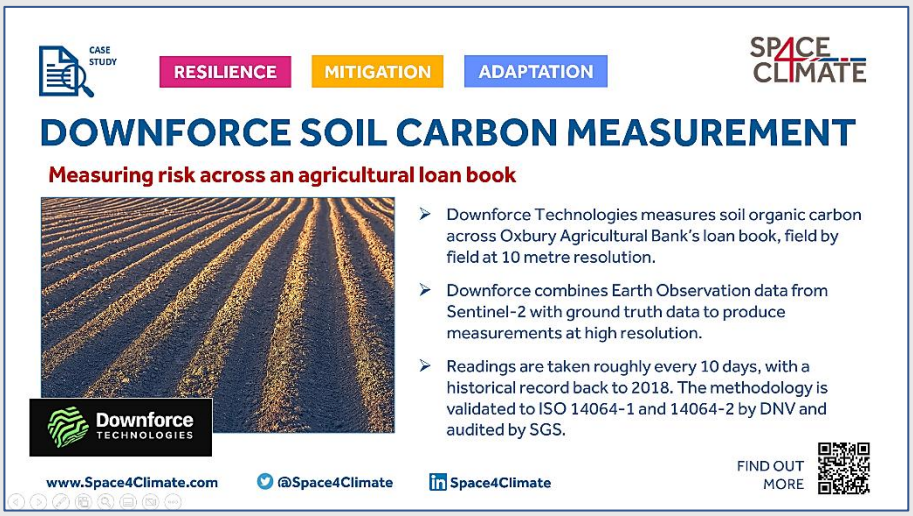
Customer: Oxbury Bank, www.oxbury.com

Oxbury is the UK's only bank dedicated to agriculture. Behind every loan on its book is a farmer who depends on the health and resilience of their soil. Soil that is losing carbon is less resilient, even before that may show up as a missed repayment. At the same time, Oxbury's board and regulators expect it to understand and report the emissions and removals in its financed portfolio, and for an agricultural lender that portfolio is almost entirely land. Soil sampling cannot logistically meet either need across hundreds of farms due to the high effort and cost.

S4C members Downforce Technologies, measures soil organic carbon across Oxbury's loan book, field by field and without farm visits, at 10 metre resolution. So far, they have assessed around 200,000 hectares across more than 780 farms, and are on the way to 240,000 hectares. Downforce combines Earth Observation data from Sentinel-2 with ground truth data to produce measurements at high resolution. Readings are taken roughly every 10 days, with a historical record back to 2018.

Oxbury now has a consistent, independent measure of land condition across its whole book, showing where soil carbon is building and where it is declining. The historical record shows how each farm's soil has held up through the ups and downs of the weather, giving evidence of good practice over time. Every farmer receives the data for their own land, so Oxbury's relationship managers can sit down with them and have a conversation grounded in evidence both sides can see.

"We have ambitions to map soil organic carbon across our whole loan book as quickly as practically possible – and in our view, Downforce is the only solution that can deliver on that.", Matt Ryan, Chief Commercial Officer, Oxbury Bank



Case Study: Map Impact – Strengthening Welsh wildfire resilience

Map Impact: https://www.mapimpact.io/case-studies/strengthening-welsh-wildfire-resilience/

Customer: Welsh Government

S4C members Map Impact provided WildfireView to the Welsh Government in the wake of South Wales and Mid and West Wales Fire and Rescue Services having declared major incidents, with military support deployed to assist response efforts.

It is a UK-wide geospatial dataset that assesses the relative susceptibility of land to wildfire occurrence. The data product combines environmental, topographical and land cover information to create a consistent picture of wildfire hazard across Wales, enabling users to identify locations where future incidents may be more likely and where consequences could be most significant.

Designed for use by government, asset managers, resilience partnerships and emergency responders, WildfireView transforms complex environmental information into accessible location-specific intelligence. This allows wildfire risk to be considered within strategic planning, resilience assessments, emergency preparedness exercises and resource allocation decisions, helping organisations move from reactive response towards proactive risk management.

The government team are beginning to use the wildfire data for assessment of national critical infrastructure to understand where the risk hotpots are that need attention.



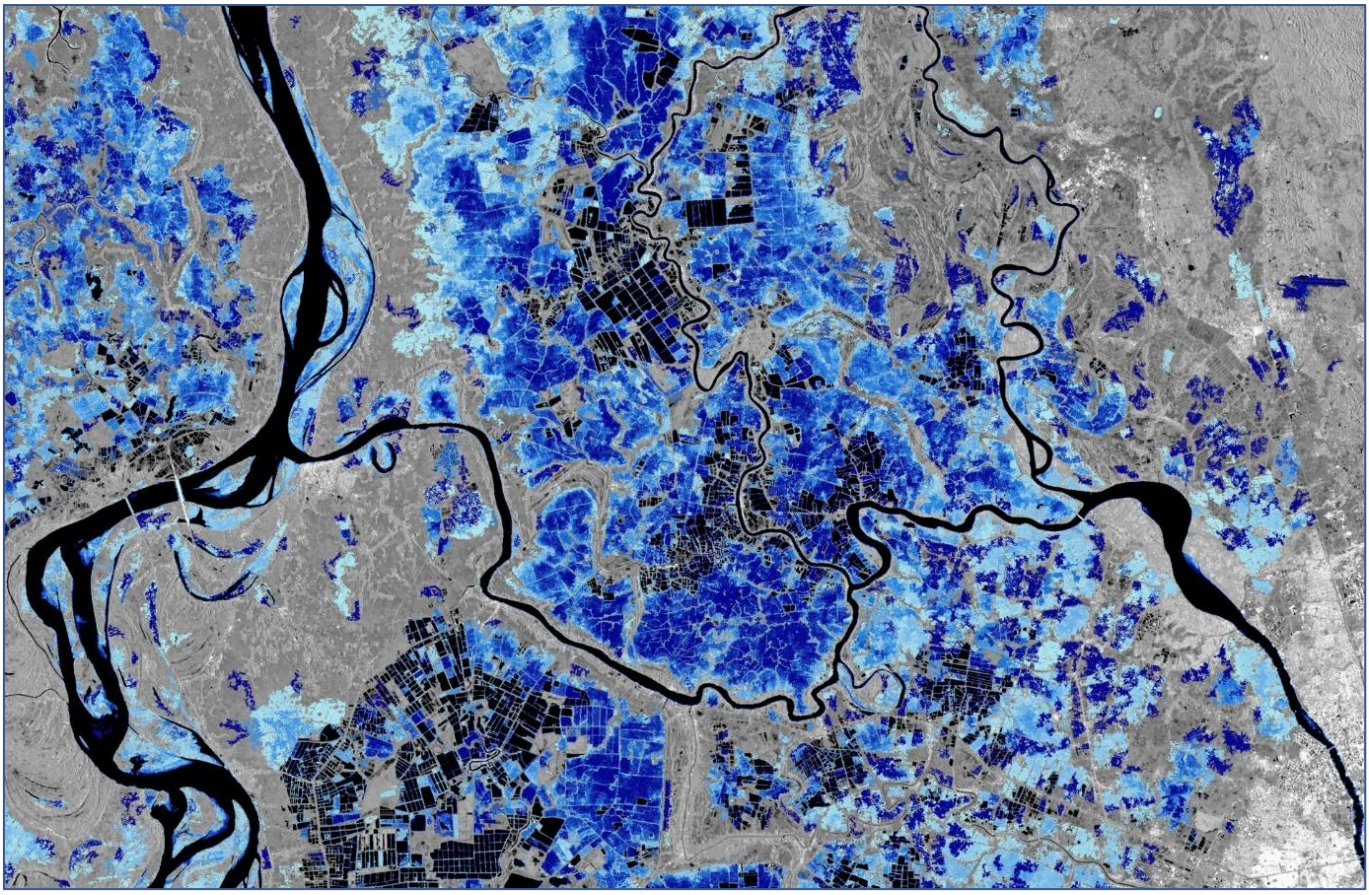


Figure 5 Modified Copernicus Sentinel data (2021), processed by the Luxembourg Institute of Science and Technology (LIST)

3.4 Space Data for Parametric Insurance

Challenge

Climate-related hazards are increasing pressure on traditional insurance models. There is growing interest in whether Earth Observation, environmental intelligence and property-level data can support new approaches that improve affordability, reduce response times and strengthen resilience.

Key findings

- Parametric insurance offers significantly faster payouts than traditional indemnity models.
- Earth Observation provides an increasingly reliable source of information for hazard detection and trigger verification.
- Basis risk remains the primary barrier to wider adoption.
- The most effective solutions combine EO with additional data sources, including property information, sensors and operational datasets.

- Parametric approaches may improve capital efficiency for insurers and increase coverage in high-risk areas.
- Parametric insurance is highly dependent on large volumes of EO and commercial datasets.
- Data access and commercial sensitivity are major barriers.
- Understanding correlations between hazards remains a significant challenge.
- Industry data sharing is difficult but essential.
- Trigger design and standardisation remain unresolved challenge.

Opportunities

- Faster recovery following extreme weather events.
- Improved flood resilience.
- Multi-hazard insurance products.
- Better risk modelling and pricing.
- Increased insurance availability in underserved markets.
- Greater competition and innovation within climate-risk services.
- Developing trusted mechanisms for confidential sharing of insurance and hazard data.

Next steps

- Develop pilot programmes focused on flood resilience and climate-risk protection.
- Test multi-source data approaches to reduce basis risk.
- Improve understanding of asset vulnerabilities and hazard interactions.
- Explore opportunities for greater use of open EO datasets.
- Foster collaboration between insurers, EO providers, regulators and resilience stakeholders.
- Establish collaborative research programmes involving insurers, EO providers and regulators to improve access to data and develop robust trigger methodologies.

S4C Members present at the discussion with relevant services	Example
Catalyst CATALYST Solutions - CATALYST	CATALYST INSIGHTS is a family of solutions with dedicated solutions for Ground Displacement Monitoring and Vegetation Management.
NetZero Protocol NetZero Protocol | Sustainability Intelligence	Provides asset-level climate risk infrastructure for regulated financial institutions
Nature Equity Nature Equity | natural capital	Uses AI and satellite data to understand water inundation and flood risk to create flood resilience

Case Study: TAMSAT - Rainfall and soil moisture estimates across Africa

Home – TAMSAT

Customer: Metrological Agencies and the Start Network (About us | Start Network)

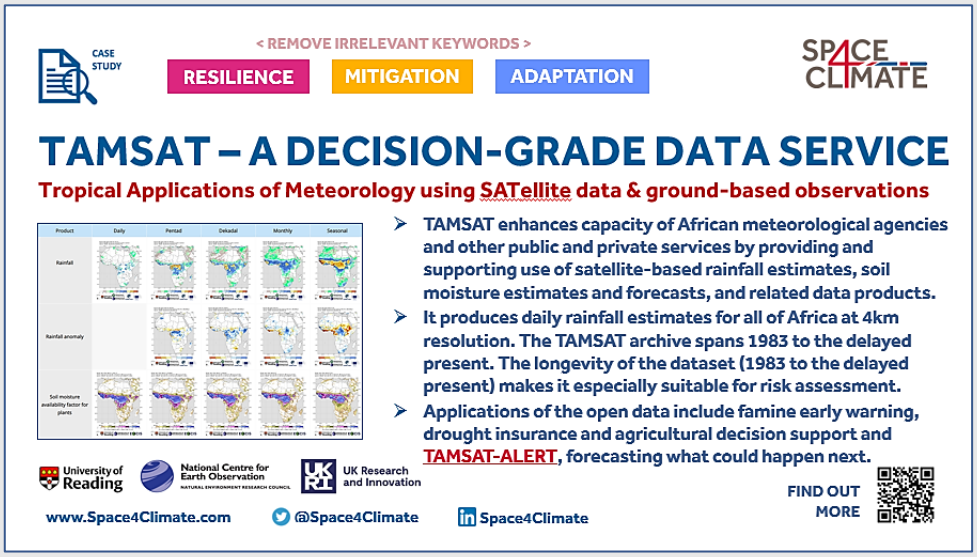
TAMSAT (Tropical Applications of Meteorology using SATellite data and ground-based observations) enhances the capacity of African meteorological agencies and other organisations by providing and supporting the operational use of satellite-based rainfall estimates, soil moisture estimates and forecasts, and related data products.

TAMSAT produces daily rainfall estimates for all of Africa at 4km resolution. The TAMSAT archive spans 1983 to the delayed present. The longevity of the dataset makes it especially suitable for risk assessment. Applications of the data include famine early warning, drought insurance and agricultural decision support. All TAMSAT data are released for operational, research and commercial use under a creative commons license.

TAMSAT, established by the University of Reading in 1977, has been gathering data continuously since 1983. The group has developed close collaborations with the Climate Division of the National Centre for Atmospheric Science (NCAS) and the National Centre for Earth Observation (NCEO), collaborating with several international partners, to extend the range of climate services it provides.

TAMSAT has developed a soil moisture service providing daily estimates across Africa from 1983 to the present. Building on this is TAMSAT-ALERT, which moves the service from monitoring current and historical conditions towards forecasting what could happen next.

TAMSAT-ALERT combines weather forecasts with land-surface modelling and historical information to produce probabilistic forecasts of future soil moisture conditions for uses such as parametric insurance. This can provide early warning of agricultural drought weeks to months ahead, giving organisations valuable time to prepare and act before the impacts are fully felt.



Case Study Telespazio UK – EO veracity: how to create trust in EO

Home — EO Veracity PoC Verification

Customer: EO supply chains

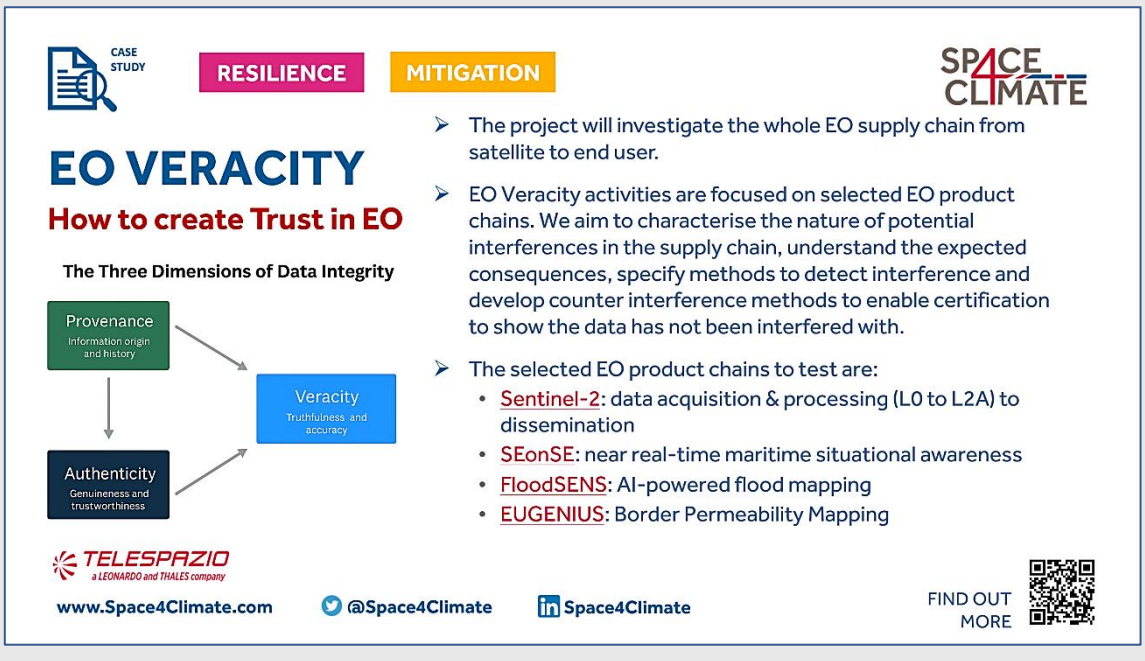
Trusted data inputs into AI are key if we are to be able to trust the outputs, particularly for regulated industries such as financial services. With today's capabilities to change imagery and data we need robust quality assured trackability of data all the way from its source.

Led by Telespazio UK (TPZ UK) Earth Observation (EO) Veracity Proof of Concept (PoC) Verification is a European Space Agency (ESA) funded project investigating how EO data could be interfered with, how to counter this interference, and how to guarantee the veracity, or truthfulness and accuracy, of the information provided.

The project will investigate the whole EO supply chain from satellite to end user. EO Veracity activities are focused on selected EO product chains, to analyse and characterise the end-to-end EO data supply chain. This will allow us to characterise the nature of potential interferences in the supply chain and understand the expected consequences. We aim to specify methods to detect potential interference and develop ways to counter interference and integrate these into monitoring capabilities so that an EO chain can be certified that it has not being subjected to interference. The PoC will conclude in February 2027.

The selected EO product chains to test are:

- Sentinel-2: data acquisition & processing (L0 to L2A) to dissemination
- SEonSE: near real-time maritime situational awareness
- FloodSENS: AI-powered flood mapping
- EUGENIUS: Border Permeability Mapping



4. Workshop Summary

Across all four workshop themes, participants arrived at similar conclusions:

- Resilience challenges are inherently cross-sector and require systems thinking.
- EO delivers greatest value when integrated with other data sources.
- Shared national datasets and standards are critical enabling infrastructure.
- Predictive monitoring delivers greater value than retrospective reporting.
- The strongest business cases are those that support multiple stakeholders and policy objectives simultaneously.

The workshop central conclusion: **Earth Observation should be treated as a shared national resilience capability, underpinned by common data foundations, standards and collaborative delivery models.**

5. S4C Member Solutions and Further Information

We have illustrated just a few examples of member solutions with real customers throughout this report. Explore more of our members' solutions by scanning the QR code or online at www.space4climate.com

Space4Climate provides market adaption breakthrough reports on:

- Agriculture
- GHG emissions
- Sustainable Finance

These are funded, deep dives into the specific market areas. Download the reports here: Navigating Market Adoption of Satellite-based Climate Services - Space4Climate

We also publish specific Member Spotlights, below are examples that relate to some of the challenge areas highlighted;

- Abaco Group on Soil Health: https://space4climate.com/digital-soil-mapping-for-a-changing-climate/
- Bright Ascension on spacecraft software deployed for climate resilience solutions: https://space4climate.com/from-orbit-to-action-satellites-enabling-climate-resilience/
- GHGSat on global emissions reporting: https://space4climate.com/ghgsat-global-emissions-monitoring/

6. Final Comments

With multiple risks appearing across the UK because of climate change and geopolitical uncertainty, we have an opportunity to mobilise the EO community into delivering real world value in support of UK resilience.

As highlighted, the UK possesses world-leading capabilities in satellite technology, Earth Observation (EO), geospatial analytics and environmental science. Now is the opportunity to support the operationalisation and uptake of these services to ensure we can support policymakers to deliver resilient infrastructure, nature, finance and public services.

By treating EO as foundational national infrastructure, the UK has an opportunity to improve resilience outcomes, strengthen public services, accelerate environmental recovery and support economic growth while maximising the value of investment in the domestic space sector.

Space4Climate will use this report as a baseline to build upon, and to understand how we can support our community in addressing barriers and in identifying opportunities to meet the challenge.

For further information, or to hear about future Space4Climate events, please email Space4Climate@reading.ac.uk

Appendix: Detailed problem statements provided to the discussion groups:

A. Space data for Critical Infrastructure and scenario planning:

1. Problem from Ofgem:
   Ofgem is responsible for ensuring that UK gas network operators monitor and reduce pipeline leaks, both for health and safety reasons and to minimise gas losses, which are estimated to cost around £hundreds of millions annually.

Current approach and limitations:
Leak detection is currently carried out by four UK operators, with inspection cycles [covering their low pressure and medium pressure networks] ranging from annual to once every five years. Leaks range from large scale to small numerous dispersed sites. Existing ground-based methods, primarily vehicle-based surveys, cannot efficiently or comprehensively cover the full extent of the network, particularly in areas where the network is under fields/agricultural land [usually in their intermediate pressure and high-pressure networks].

Key questions:

- How can satellite data be used to enhance leak detection, improve coverage, and support more timely and cost-effective monitoring across the gas network?
- And what changes would need to occur for satellite data to be able to be used operationally? At what detection limits would this be feasible? What are the barriers to an effective UK monitoring system?

For added information, below are links to some of the work on methane monitoring that the UK Space Agency (UKSA) has supported recently:

- UK Space Agency teams up with IMEO and GHGSat to tackle methane emissions – UK Space Agency blog
- UK-based ESA Programme - Emissions Watch | InCubed
- UK-based ESA Programme - Methane Emissions: Testing, Reporting & Implementing Common Practices for Satellites (METRICS)
- UKSA CEOS objectives (Methane best practice) - UK Leads Global Earth Observation as CEOS Chair in 2025 – UK Space Agency blog

2. Problem from Ministry of Justice - Scenario Planning (has been discussed with planning professionals): The Ministry of Justice (MoJ) prison estate is a major and growing source of carbon emissions, with prisons representing one of the largest

contributors to public sector CO_2 output after the health service. A significant proportion of this estate consists of ageing, energy-inefficient buildings - many of which rely on outdated infrastructure such as backup generators - making them particularly carbon-intensive and costly to operate.

Current approach and limitations:
There is currently limited visibility over which individual prisons are the worst performers in terms of emissions, energy use and climate risk exposure. This lack of data-driven insight prevents targeted interventions and slows progress toward sustainability goals.

At the same time, these older facilities are increasingly vulnerable to the impacts of climate change. Flooding is a critical and frequent issue, yet detection is often reactive - only identified once water is already entering buildings. This absence of early warning systems creates significant operational disruption, including failures in prisoner transport and court logistics, as well as increased safety risks.
Extreme heat is also an escalating concern, posing serious health and wellbeing risks to both prisoners and staff, particularly in poorly adapted buildings. There is therefore an urgent need for an integrated approach.

Key questions:

Can satellite Earth Observation data (data / platforms / products) provide actionable intelligence to support / improve:

- Robust monitoring and analytics to identify high-emission and high-risk sites across the estate?
- Real-time alerting systems for flood and heat events to improve preparedness and response?
- Predictive data and scenario planning tools to support long-term adaptation and resilience strategies?

Without these capabilities, the MoJ faces continued operational disruption, increased safety risks, and challenges in meeting its sustainability and net zero targets

3. Problem Statement: Data to support resilient communities and growth for Town and Country Planning - Effective town and country planning increasingly depends on integrating diverse data sources, yet current approaches lack a coherent, high-quality synthesis of Earth observation (EO) and geospatial data.

Current approach and limitations:
Critical datasets such as land use, community demographics, flood risk, and topographical change exist but are often fragmented, outdated, or insufficiently detailed. This limits

planners' ability to build an accurate, real-time picture of how places are evolving, constraining evidence-based decision-making.

4. Problem statement: Fragmented data restricting use in planning applications - Fragmented data governance and uncertainty around what can be legally shared are major barriers to effective emergency planning and long-term decision-making within local authorities.

Current approach and limitations:
Access to critical datasets, such as Earth Observation (EO) and climate data, is often slowed by unclear permissions, inconsistent standard, and risk-averse approaches to data use. This prevents timely, evidence-based responses during emergencies and limits the ability of planners to assess future risks, model scenarios, and act proactively.

B. Forestry

1. Forest Alerts (MOD): Would like to be able to predict future fire risk and have near real-time alerts on fires to enable appropriate deployment and risk analysis
2. Forest Monitoring for consistent and comparable carbon credit calculations and monitoring (Scottish Forestry, Woodland Code)
3. Challenges around independent monitoring 5 years into planting as trees are very small and vary in scale due to variations in slope, aspect and soil composition.

C. Nature Resilience

Natural England are mature users of EO but are considering how they can build in an Ecosystem Health monitoring approach based on Natural Ecosystem Function (NEF) Indicators and structural heterogeneity information supported by new tech for condition monitoring across SSSIs in England.

They want to build climate change adaptation thinking into Protected Sites monitoring in the future. They are developing a ForeSite Web App based in ArcGIS online (AGOL) to coral a range of habitat mapping/modelling products such as Living England, England Peat Map (EPM), Coastal Dune and Saltmarsh mapping using CASI and LIDAR to put into the hands of our area teams.

They also include Seasonal Sentinel-2 Productivity and Wetness Indices mapping derived from Living England seasonal imagery mosaic outputs to look to assess how they can use as a pre-assessment habitat mapping tool to inform the carrying out of a Whole Feature Assessment (WFA) to monitor SSSI condition. A SSSI Scrub map is also under development to give structural heterogeneity vegetation information.

Additional to the build of ForeSite they are working in partnership with the JNCC on their HabCon and Crick Framework project they are developing that is focusing the use of near real time monthly Productivity (NDVI) and Surface Water (NDWI) and Plant Moisture (NDMI) Wetness Indices on SSSIs derived also from Sentinel-2 imagery based on the spectral signature framework of Living England segmentation.

They are looking to see if they can use Sentinel-2 imagery to relate such indices of change over time to the 5 Pillars of Natural Ecosystem Function (NEF) in particular Hydrology and Nutrient pillars for informing an Ecosystem Health Indicator approach.

They want to investigate the use of Productivity and Wetness Indices potential to be used in a desk-based way for change detection purposes, trajectory of change and targeting survey effort, using HabCon and the JNCC Crick Framework.

They would like to consider the potential for informing some elements of condition through the better understanding of indices scale levels and thresholds that could be associated with pass and fail in condition, specific to different habitats or levels of wetness for monitoring i.e. wetlands, wet or dry grasslands, wet or dry heaths and assessing the impact and frequency of flooding and drought from Climate Change over time.

In summary, key areas of interest are

1. Monitoring of SSSIs: Can EO identify ecosystem tipping points in rest of world to inform our work in England. They are interested in soil moisture levels in boggy, marshy areas because climate change is impacting their protected sites.
    - Understanding hydrology and what is changing is key for the overlying soil structure. Being able to monitor expansion/contractions of wetlands over time is important and would ultimately all feed into SSSI condition assessments and help NE staff make management recommendations where appropriate.
2. Climate vulnerability mapping & climate impacts on priority habitats. Can EO provide opportunity mapping / data for climate mitigation projects focused on nature restoration.
3. EO for environmental monitoring. How can we better use Earth Observation to support the understanding of climate vulnerability, as well as impacts and opportunities for priority habitats and species?

key questions:

- Can Earth Observation identify ecosystem tipping points that would inform site management for biodiversity enhancement?
- Can Earth Observation support opportunity mapping for nature restoration projects?
- What insights exist in Earth Observation for environmental monitoring now and in the future to understand repeated issues (for example, the monitoring of invasive

species spread and the impact and frequency of flooding and drought from Climate Change over time?

D Space data for Parametric Insurance

Problem statement: Can augmented parametric insurance replace indemnity cover for residential flood and storm risk?

Parametric insurance can provide faster, more transparent payouts after climate-related disasters, but in residential property markets it is usually used as a **complement** to indemnity insurance, not a replacement. The main barrier is **basis risk**: the risk that the trigger and payout do not match the actual loss suffered by the homeowner.

This problem statement asks whether **augmented parametric insurance** - parametric cover enhanced by EO, property-level data, catastrophe modelling and IoT sensing - could reduce basis risk enough to replace traditional indemnity insurance for residential flood and storm damage. Such a model would combine observations of hazard intensity, such as flood extent, rainfall, wind, storm surge and post-event damage signals, with property-specific vulnerability data, including elevation, floor height, construction type, roof structure, flood resilience and reinstatement cost. In-home or near-home IoT sensors could add direct evidence of actual damage, such as water ingress, internal flood depth, humidity, structural movement, roof leakage or power interruption.

The potential benefits are significant: **faster payments, lower adjustment costs, fewer disputes, reduced litigation, improved pricing, better fraud control and increased insurability in high-risk areas**. The key issue is whether the remaining basis risk would be acceptable to households, insurers, reinsurers, regulators and mortgage lenders.

Key questions:

1. **Can EO materially reduce basis risk?**
   Which current and future EO capabilities are most useful for estimating residential flood and storm damage at property level?
2. **What data are needed beyond EO?**
   Which property characteristics, hazard models and exposure data are essential to convert observed events into reliable loss estimates?
3. **Can IoT sensors close the gap between hazard and actual damage?**
   Could in-home or near-home sensors provide enough direct evidence to support automatic or semi-automatic payouts?
4. **Could augmented parametric insurance reduce the cost of home insurance?**
   Would savings from lower claims-adjustment costs, faster settlement and fewer disputes be large enough to reduce premiums, deductibles or public-sector support?

5. Could it increase flood and storm cover?
   Could better data make currently underinsured or hard-to-insure homes more insurable, or would more granular risk information mainly lead to sharper risk-based pricing?

The objective is not to assume that indemnity insurance can already be replaced. Rather, it is to identify the technical, actuarial, regulatory and consumer-protection conditions under which replacement might become feasible, either for full buildings cover or for specific layers such as contents, temporary accommodation, cleanup costs, excess protection or capped repair costs.

This topic would benefit from engagement with **insurers, reinsurers, EO and satellite data providers, IoT firms, catastrophe modellers, mortgage lenders, regulators and public-sector flood-risk agencies**.